Some Semi-deep Thoughts About Deep Reading: Rejoinder to "Digital Technology and Student Cognitive Development: The Neuroscience of the University Classroom"

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In one of my classes at the School of Informatics and Computing, IUPUI, students write final papers about an emerging information technology they can envision amplified in the future. Pick a technology; now imagine it times a million: Is it heaven, or hell? Some extreme characterization is important. Unless that vision elicits some deep hope or fear, the students have a hard time psyching themselves up for a respectably long paper—"long paper" meaning maybe 10 to 12 pages (half or a third what I would have written as a student 40 years ago). Most of their hopes and fears arise from tension between, on one hand, the power of technology to shape human behavior and experience and, on the other, their perception that "human nature" is immutable and cannot (or can only painfully) evolve to accommodate this technologically shaped behavior. Over the years, students have generally split 70:30 in choosing a heavenly or hellish technology. The young are usually optimistic. And these students have grown up in constant anticipation of the next new technological marvel, the thing that will change everything.

Techno-utopian wonder is hardly new. The telegraph whispered its promise to the world, heard by Nathaniel Hawthorne: "By means of electricity . . . The round globe is a vast . . . brain, instinct with intelligence!" (Hawthorne, 1907, p. 377). Before it became all music and soap operas, radio was poetized as salvation: a voice thrown 1,000 miles to cure human loneliness, or even an instant remedy for the botched communications that cause war. The speculative fiction of the late 19th century gave us proto-video technologies such as the "lizeo" ("By means of it, not only the absent living could be made to speak

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before our eyes, but also the dead, even of remote ages. Every family possessed a very complete series of family portraits adapted to this instrument"; Macnie, 1883, p. 176) and the "varzeo" (which functioned as "a magic mirror, and almost as well as if there present, to behold . . . distant scenes"; Macnie, 1883, p. 173).

Mirror, mirror . . . the stuff of dreams. Information technologies fulfill magical hopes of human communion from miles and years away, even across the gulf of death. Scholar Steven Connor attributes the spiritualist fascination with psychic phenomena in the late 19th century, in part, to the advent of (technologically) disembodied voices (Connor, 2000). Edison spent his waning years trying to communicate with the dead. In fact, Nipper (the eventual RCA terrier), famously pictured with his head cocked listening attentively to "his master's voice," was originally posed atop a coffin. The recording was, indeed, his departed master's voice ("As former RCA executive Lou Lenzi once quipped, "Note to marketing department: Lose the coffin.")

Whether in fairytales or the real world, magic wishes can backfire, or generate unintended consequences. Alexander Graham Bell and his financial backers initially imagined a business-to-business business, not a domestic appliance: Who in the world wants a telephone in the parlor, ringing at all hours, disrupting dinner and family harmony? Apparently everyone. Who imagined that the digital technologies that promised to vastly increase written communications and make publishing a universal opportunity would lead to the death of reading—at least the "deep" reading our current authors (and others in various fields) now bemoan?

How does it happen? As suggested earlier, sometimes human nature is not all that natural. In technologized cultures, we express our "nature" only when our intrinsic cognitive capacities meet some enabling technology. Reading doesn't occur without some fairly specific and concrete combination of physical objects, environment, and purpose, whether carved stone and religious dicta, print on paper, pixels on screens, or billboards flashing by for a couple seconds. There is no "reading" per se, but many species of reading, each with its own ecology of objects, places, and meanings.

For a panoramic and immensely readable view of the cultural uses of reading, one of the best contemporary surveys is A History of Reading by Alberto Manguel (2014). As Manguel documents, silent, solitary reading was neither the first nor standard process for most of reading's 6,000-year history. Indeed, "not until the tenth century does this manner of reading become usual in the West" (p. 43). Before that, pretty much everyone read aloud, whether alone or in libraries.

And for a long while, people have been worried about reading. The authors of this thought-provoking article join an impressive cohort of current commentators and scholars united in their concern over the state of the art of reading. Mostly they are talking about the sustained, silent, generally solitary process of reading in which the reader is deeply focused on and immersed in the text. They worry that today's students lack the cognitive wherewithal for deep, immersive reading and thus will never fully experience the profound learning that college can provide. Implicit in this critique is the assumption that college-level learning is intimately, perhaps inextricably, conjoined with the idea of the book. Of course, not comic books or telephone books. We mean books that contain a deeply structured array of information, knowledge (interpretations of information), and ideas (the principles distilled from this or related knowledge). And students nowadays can't handle it.

Why not? Because students have been mesmerized by the near-telepathic allure of "digital reading," of all those texts and tweets and e-mails drizzling from their smartphones, not to mention the addling effects of all the giggles so easily available on YouTube and Facebook. Given a 900-page tome on macroeconomics, their attention fades soon after the 140th character and floats away altogether after the third or fourth page.

It's not quite their fault, the authors of the current article suggest. Why? Our brains develop via neuroplasticity, meaning the brain's neural networks become habituated to the most frequently used pathways. That constant digital drizzle has worn smooth some wide neural pathways, and these enjoy a certain cognitive privilege at the expense of other, perhaps bumpier or convoluted, pathways. Reading that requires more convoluted or deliberate cognitive processing appears at best unpalatable, at worst

impossible—and more on that later. Brain scan studies seem to show that too much digital reading makes our students neurocognitively incapable of poring over The Wealth of Nations or The Brothers Karamazov.

Without those deep processing skills, our students may never acquire the ability to truly think. Ironic, isn't it? The Information Age may have killed thinking. The good news is, information technologies have been threatening civilization for centuries. In Phaedrus, Socrates recounts the story of the Thamus, the Egyptian king distressed at the invention of writing, fearing it would kill the art of memory ("Plato's Phaedrus," n.d.), the art that truly made humans into homo sapiens—"man the wise" (pardon the gender bias).

The value of slow, sustained, immersive reading? Maybe not such a blessing. "I have actually seen mothers, in miserable garrets, crying for the imaginary distress of an heroine, while their children were crying for bread . . ." The year was 1796 and the neglectful mother was lost in a novel (Vogorinčić, 2006). Author and New York Times editor Anna North (2014) writes, "For some of the novel's 18th- and 19th-century critics, getting lost was exactly the problem . . . Today, many value novels for promoting sustained attention—for helping readers . . . to get lost." If 200 years ago deep reading induced a withdrawal from social responsibility, today it reconnects us, and "can facilitate the understanding of others who are different from ourselves and can augment our capacity for empathy and social inference" (Mar & Oatley, 2008, p. 173) and can make you a kinder, gentler person.

But let me suggest there is deep reading and then there is deep reading. Being immersed in a scholarly work is not the same as getting enthralled by Harry Potter (the books). Witches and wizards are rather more enchanting, if you will, than macro economics in 18th-century prose that requires readers to traverse 96-word sentences such as

> The commodity is then sold precisely for what it is worth, or for what it really costs the person who brings it to market; for though in common language what is called the prime cost of any commodity does not comprehend the profit of the person who is to sell it again, yet if he sells it at a price which does not allow him the ordinary rate of profit in his neighbourhood, he is evidently a loser by the trade; since by employing his stock in some other way he might have made that profit. (Smith, 1776/1904)

The average sentence length in Harry Potter and the Sorcerer's Stone: 11.67 words (Vigen, n.d.; I imagine Hermoine shouting, "Duck, Ron! It's the bibliobloatus curse!").

So let's forget Harry Potter, the Twilight Saga, and so on, and focus instead on all of that assigned reading in Econ 101. As it turns out, students have been dodging those bullets for generations. As Sappington, Kinsey, and Munsayac (2002) note, "Concerns about students' lack of reading compliance, particularly in larger classes, have been an issue for many decades" (p. 272). They conclude their discussion of "noncompliance" with reading assignments in near-moralistic terms:

> Our position is that the student bears responsibility for preparation. If the syllabus makes it clear that readings are required, that quizzing is likely, and that suitable rewards accompany quiz success, then instructors have fulfilled this aspect of the learning partnership. Student resistance is regrettable . . . Ultimately students and the greater society are better served by preparation than the lack of it. We recommend that faculty explore various methods to increase reading compliance. (p. 274)

Generally by threatening to quiz the students over the assigned reading. That'll teach 'em.

Although a certain moral fervor informs lovely little books such as The Gutenberg Elegies (Birkerts, 2006), it is largely absent from neurocognitive analyses of reading. Morality lives in the slow philosophical realm of the mind, and mind and brain are no longer interchangeable concepts, as they may have been 100 years ago. Maybe it wouldn't hurt to reconnect them a bit.

But what is also mostly missing from today's discussion is some consideration of those more convoluted processing elements mentioned earlier. In the not-distant past, deep reading was discussed as "sustained silent reading" and recognized it as a "metacognitive" process. Simply put, and neatly summarized in the early 1980s (Collins & Smith, 1980), the metacognitive reader was constantly monitoring his/her comprehension of (a) individual words (sometimes you have to look them up, or puzzle over a vague usage), (b) sentences (they can be too abstract, or at odds with previous knowledge), and (c) the connections between one sentence and another, one paragraph and another, and the overall context. Depending on the level of comprehension, the readers might reach for a dictionary, figure out the word or sentence from its context, reread for missing information, suspend judgment in hopes it will become clearer, scribble notes in the margin, or even stop reading altogether and walk down to Starbucks for an espresso in hopes it will all make sense later. Is this the "deep" reading discussed in the present article? No, and yes. It is not immersive in the sense of sitting curled on the couch, nearly immobile for hours at a time. But it sure sounds like the sort of "in-depth" study reading that leads to learning.

Some earlier researchers worried that all this checking in the metacognitive mirror made immersive reading impossible. Others responded that experienced readers of challenging materials routinely employ such metacognitive strategies without conscious effort—just as drivers routinely check the rearview mirror with no loss of attentive focus. As noted by Baker and Brown (1984), the discussion, if not always debate, has gone on for at least a century.

Knowing its historical roots does not solve our current dilemma. What history does suggest, however, is that all this quick-sip digital reading of tweets is not so much the cause of the problem but just another symptom of larger techno-cultural forces at work. Let me suggest that the deliberate cognitive or metacognitive skills required for in-depth, if not always deeply immersed, reading are disciplined practices that students acquire only after years of training, which probably needs to begin well before college, even before high school—well before their first tweet.

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